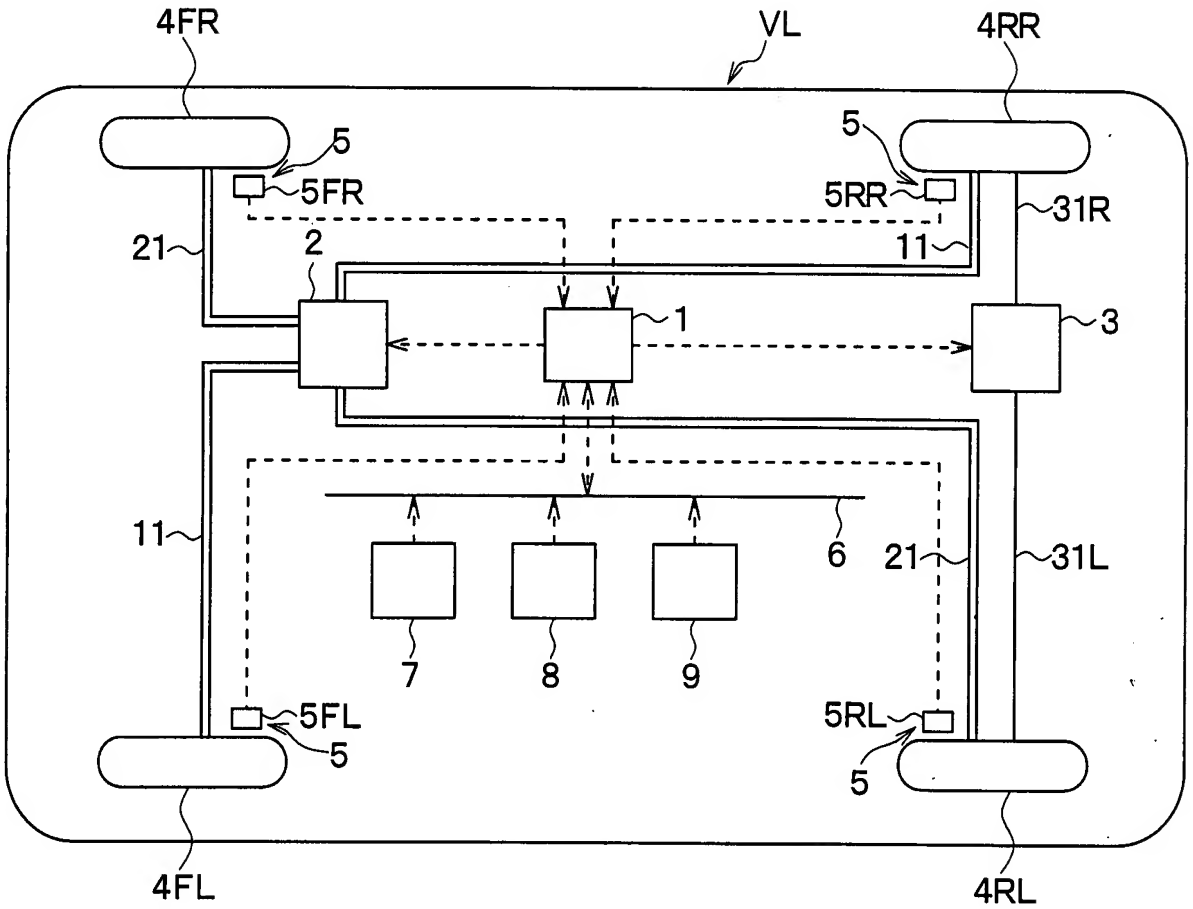

4FR
VL
4RR
5
5FR
5
5RR
21
2
11
31R
1
3
11
6
21
31L
7
8
9
5FL
5
5RL
5
4FL
4RL

FIG. 1

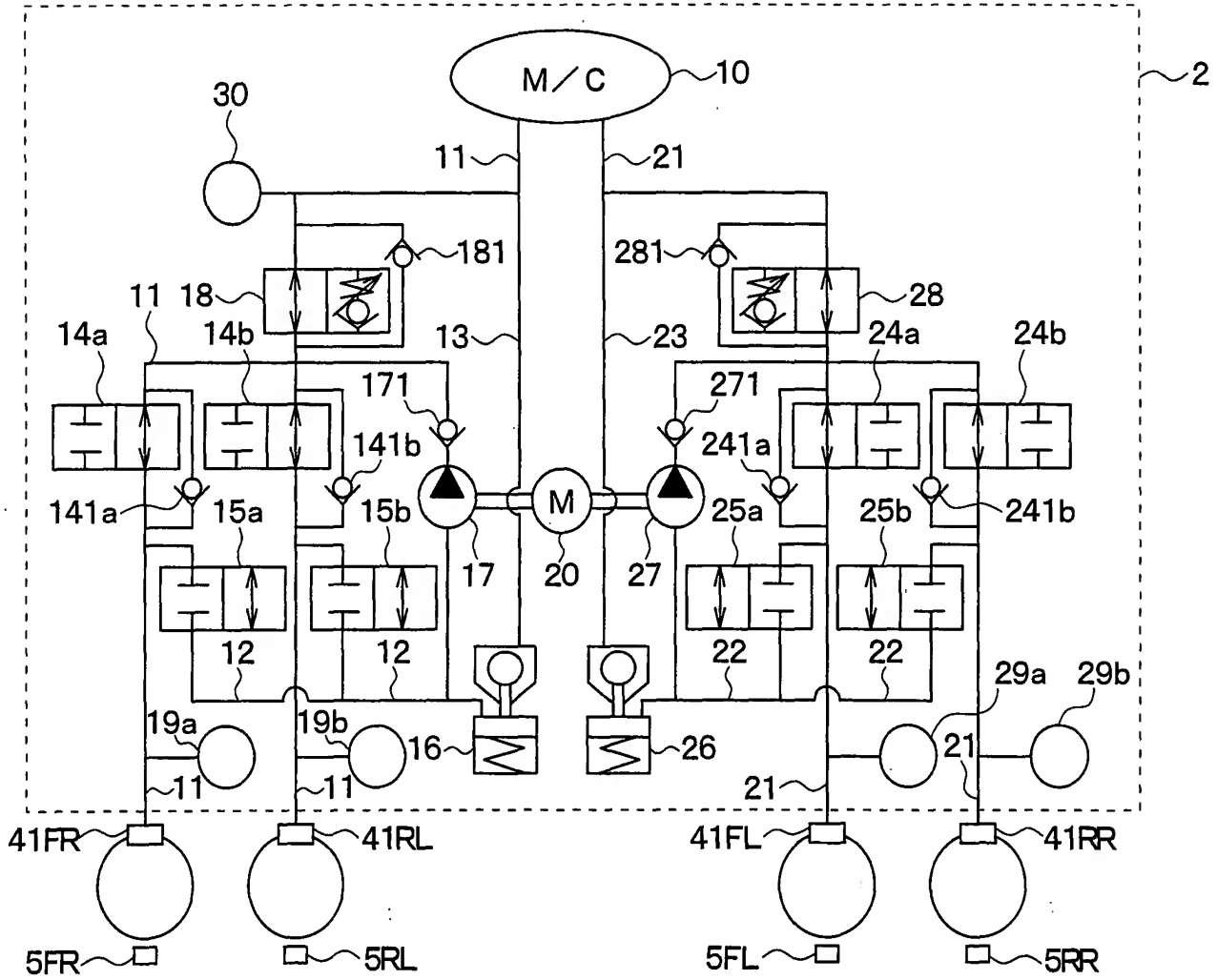

M/C
10
2
30
11
21
181
281
18
28
14a
14b
13
23
24a
24b
171
271
141b
241a
141a
15a
15b
M
25a
25b
241b
17
20
27
12
12
22
22
29a
29b
19a
19b
16
26
21
11
11
21
41FR
41RL
41FL
41RR
5FR
5RL
5FL
5RR

FIG. 2

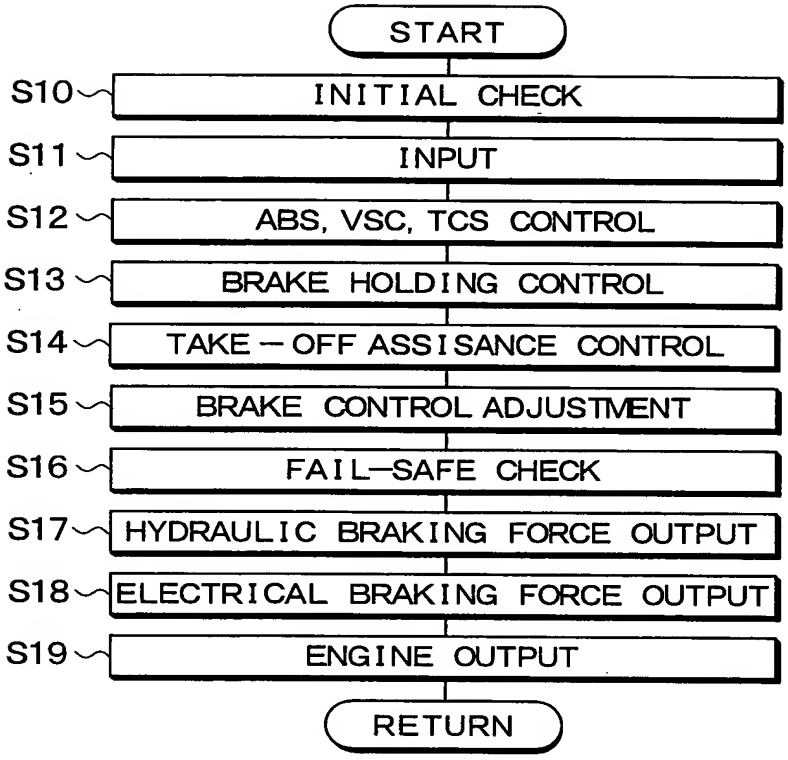

START
S10
INITIAL CHECK
S11
INPUT
S12
ABS, VSC, TCS CONTROL
S13
BRAKE HOLDING CONTROL
S14
TAKE－OFF ASSISANCE CONTROL
S15
BRAKE CONTROL ADJUSTMENT
S16
FAIL－SAFE CHECK
S17
HYDRAULIC BRAKING FORCE OUTPUT
S18
ELECTRICAL BRAKING FORCE OUTPUT
S19
ENGINE OUTPUT
RETURN

FIG .3

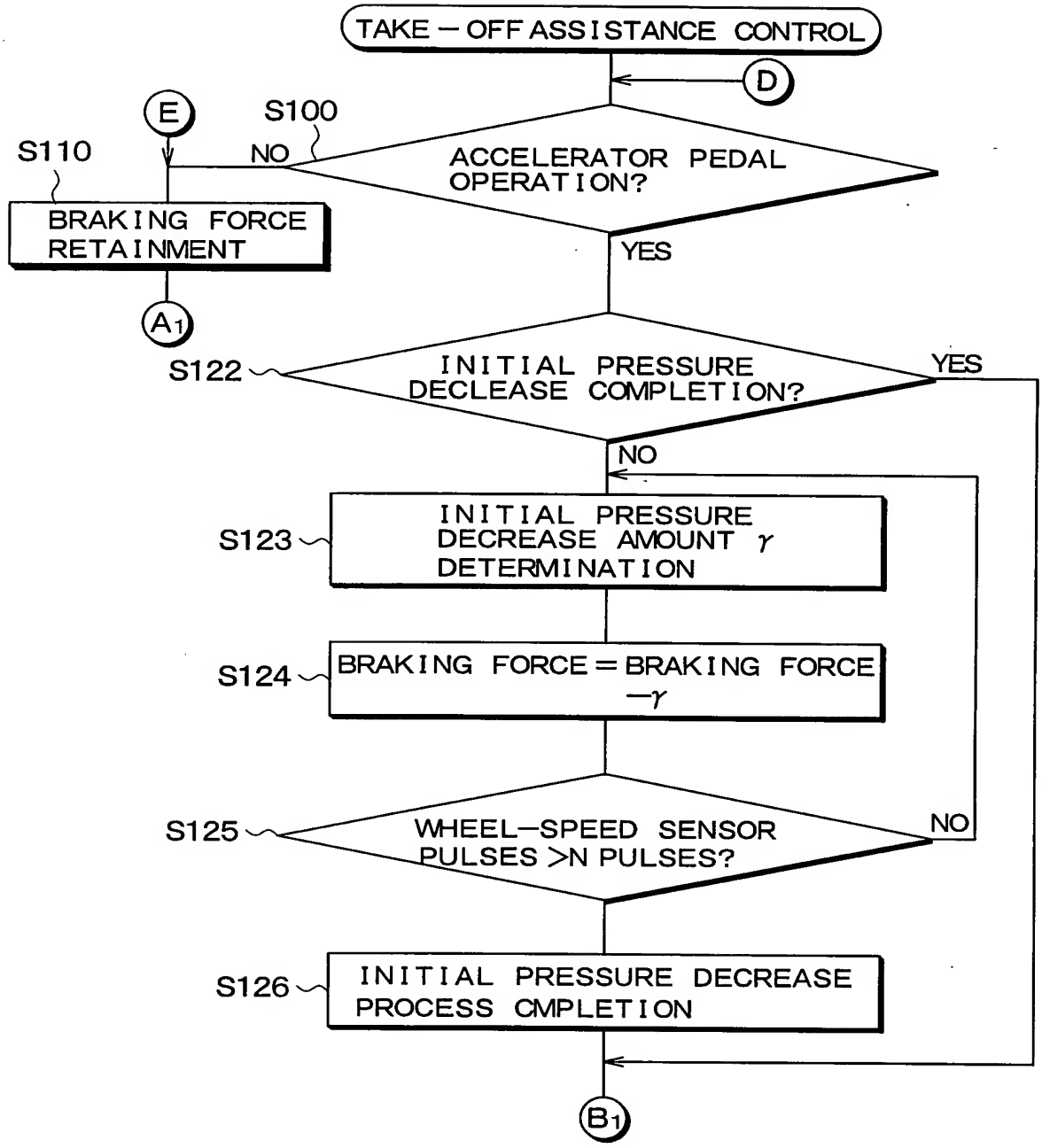

TAKE－OFF ASSISTANCE CONTROL
D
E
S100
S110
NO
ACCELERATOR PEDAL OPERATION?
BRAKING FORCE RETAINMENT
YES
A1
S122
INITIAL PRESSURE DECLEASE COMPLETION?
YES
NO
S123
INITIAL PRESSURE DECREASE AMOUNT γ DETERMINATION
S124
BRAKING FORCE＝BRAKING FORCE －γ
S125
WHEEL－SPEED SENSOR PULSES >N PULSES?
NO
S126
INITIAL PRESSURE DECREASE PROCESS CMPLETION
B1

FIG . 4

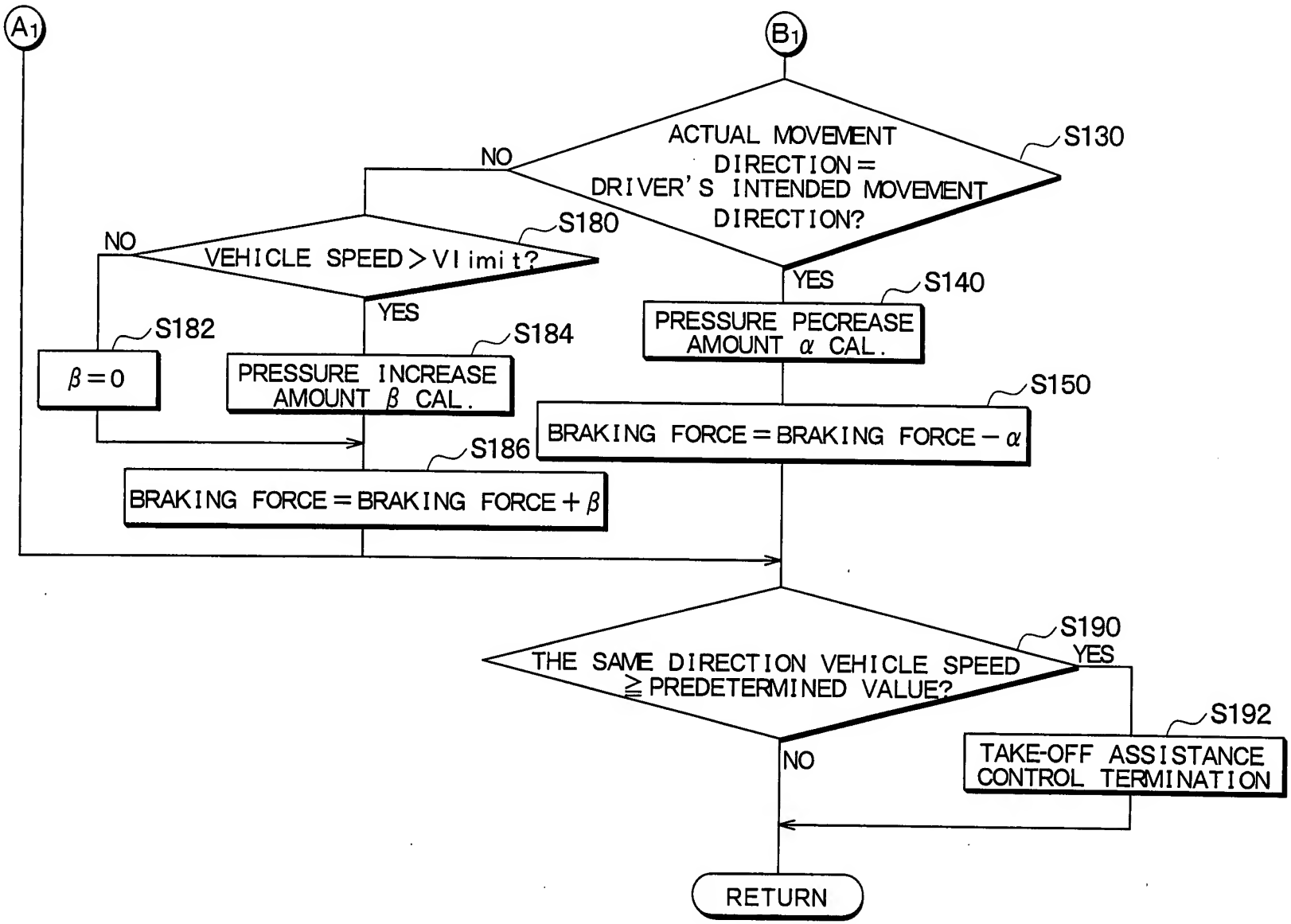
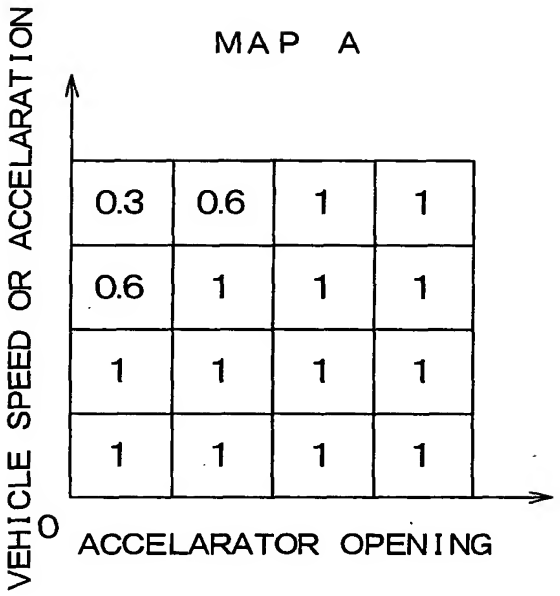

A1
B1
ACTUAL MOVEMENT DIRECTION = DRIVER'S INTENDED MOVEMENT DIRECTION?
S130
NO
YES
VEHICLE SPEED > Vlimit?
S180
NO
YES
S182
β = 0
PRESSURE INCREASE AMOUNT β CAL.
S184
PRESSURE PECREASE AMOUNT α CAL.
S140
BRAKING FORCE = BRAKING FORCE − α
S150
BRAKING FORCE = BRAKING FORCE + β
S186
THE SAME DIRECTION VEHICLE SPEED ≧ PREDETERMINED VALUE?
S190
YES
NO
TAKE-OFF ASSISTANCE CONTROL TERMINATION
S192
RETURN

FIG. 5



$\alpha = K1 \times A$ (ACCELARATOR OPENING、VEHICLE SPEED)

OR

$\alpha = K1 \times A$ (ACCELARATOR OPENING、ACCELARATION)

FIG .6

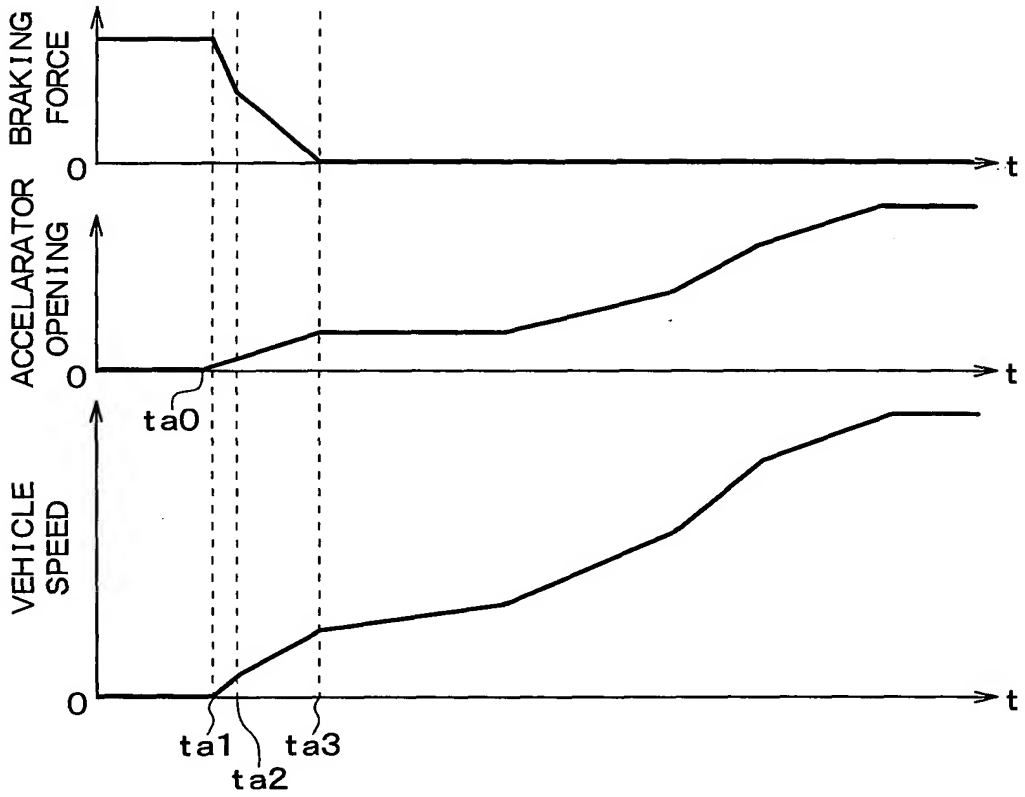

BRAKING FORCE
0
t
ACCELARATOR OPENING
0
t
ta0
VEHICLE SPEED
0
t
ta1
ta2
ta3

FIG. 7

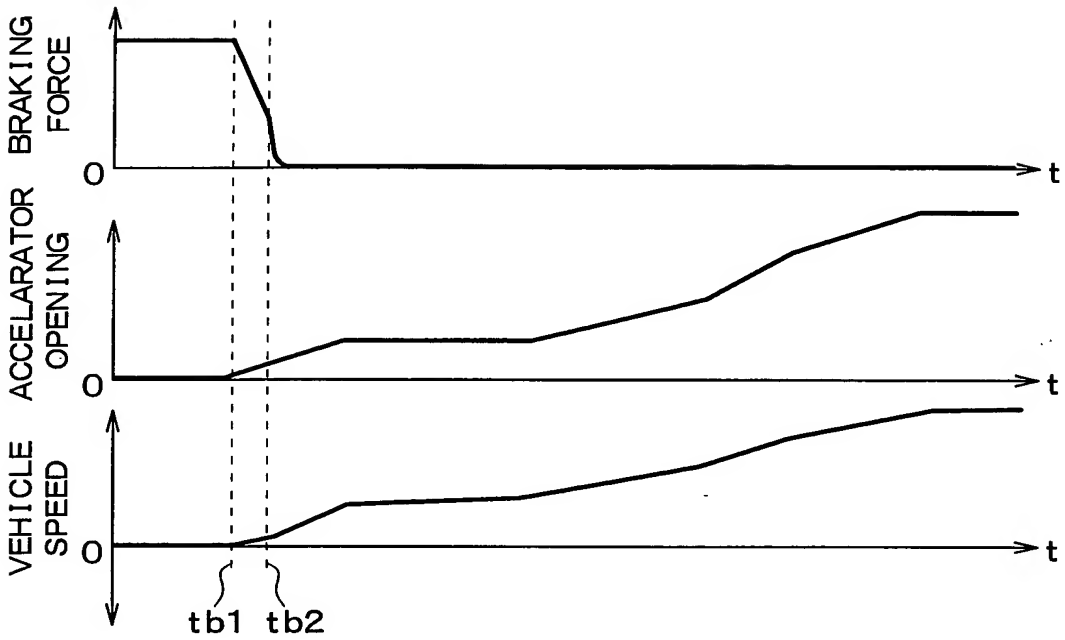

BRAKING FORCE
O
t
ACCELARATOR OPENING
O
t
VEHICLE SPEED
O
t
tb1
tb2

FIG. 8

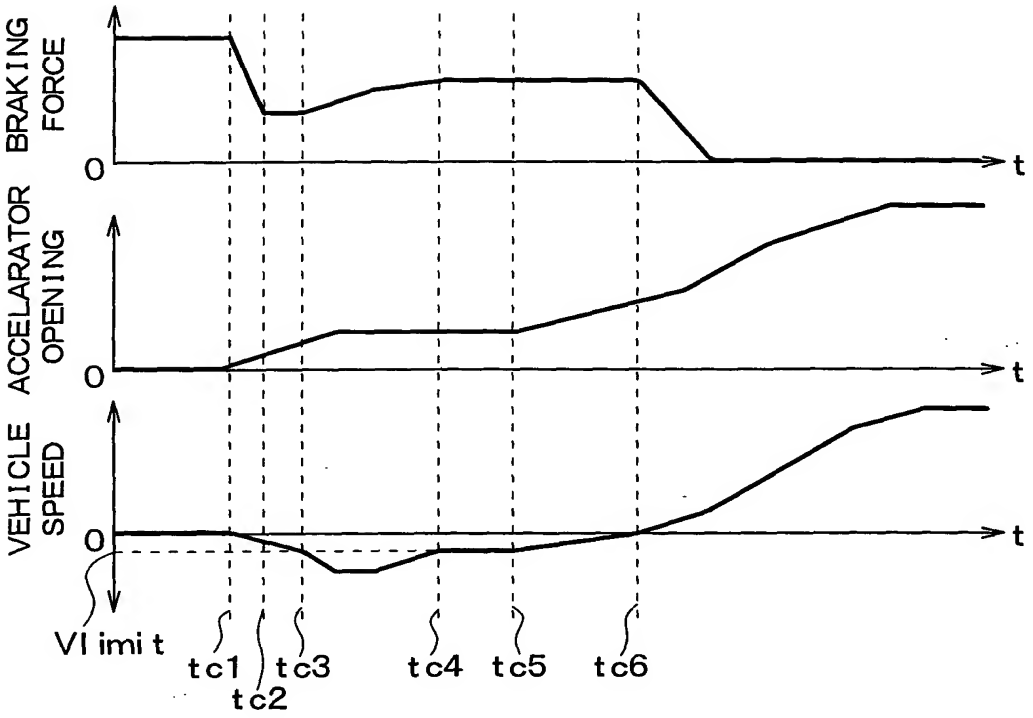

BRAKING FORCE
0
t
ACCELARATOR OPENING
0
t
VEHICLE SPEED
0
t
Vlimit
tc1
tc2
tc3
tc4
tc5
tc6

FIG. 9

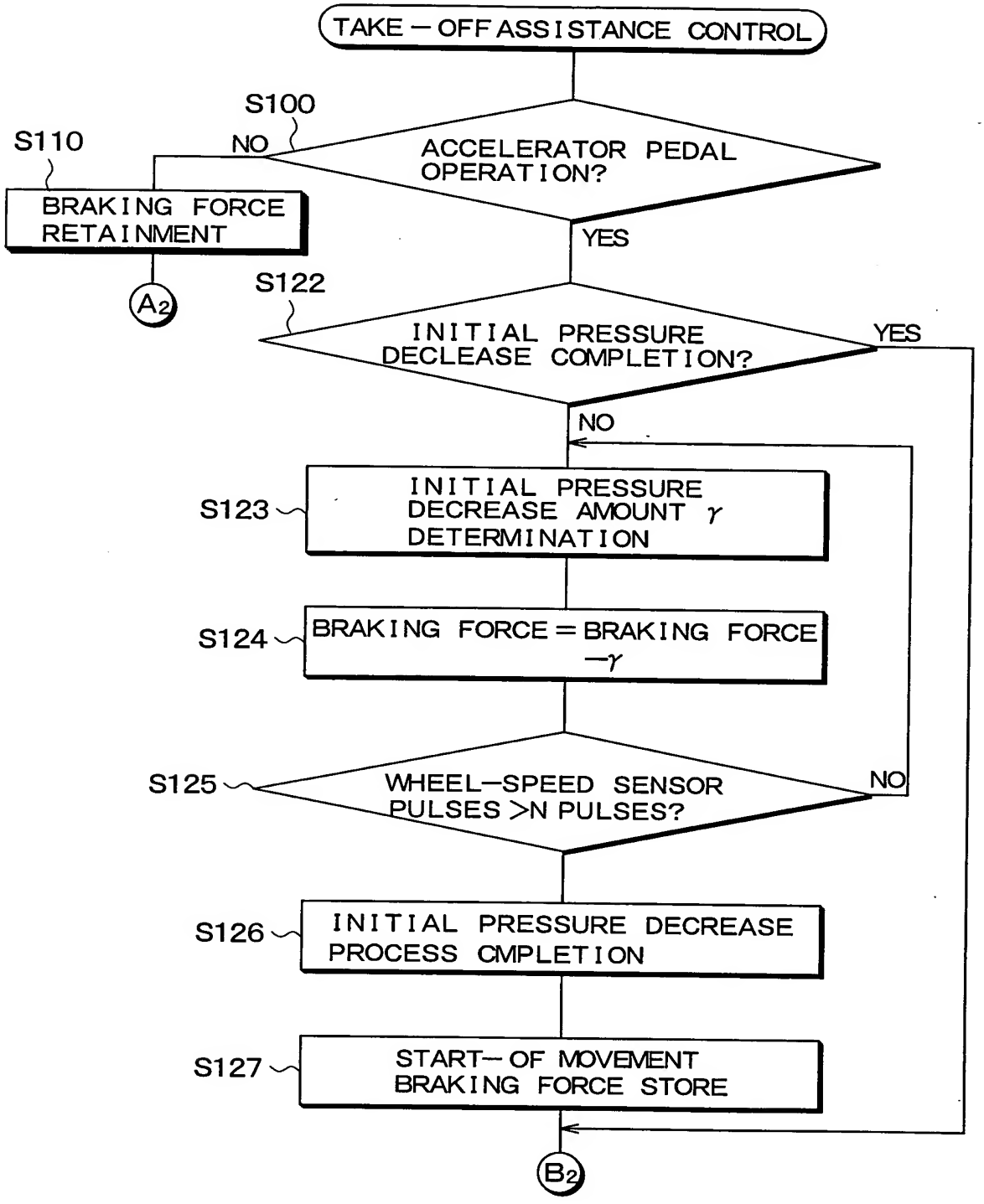

TAKE－OFF ASSISTANCE CONTROL
S100
ACCELERATOR PEDAL OPERATION?
NO
S110
BRAKING FORCE RETAINMENT
A2
YES
S122
INITIAL PRESSURE DECLEASE COMPLETION?
YES
NO
S123
INITIAL PRESSURE DECREASE AMOUNT γ DETERMINATION
S124
BRAKING FORCE = BRAKING FORCE −γ
S125
WHEEL−SPEED SENSOR PULSES >N PULSES?
NO
S126
INITIAL PRESSURE DECREASE PROCESS CMPLETION
S127
START− OF MOVEMENT BRAKING FORCE STORE
B2

FIG . 10

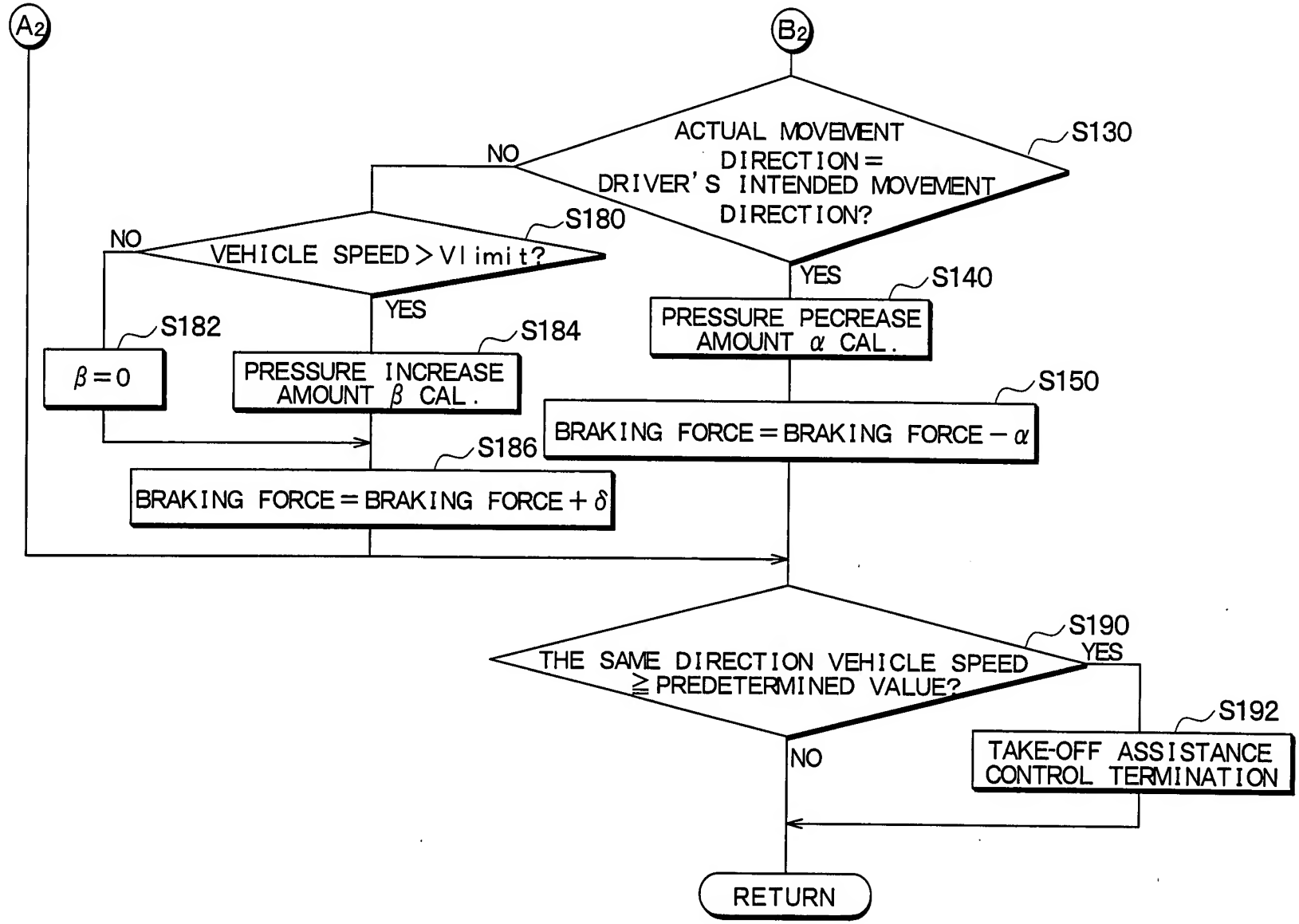

A2
B2
ACTUAL MOVEMENT DIRECTION = DRIVER'S INTENDED MOVEMENT DIRECTION?
S130
NO
YES
VEHICLE SPEED > Vlimit?
S180
NO
YES
S182
β = 0
PRESSURE INCREASE AMOUNT β CAL.
S184
PRESSURE DECREASE AMOUNT α CAL.
S140
BRAKING FORCE = BRAKING FORCE − α
S150
BRAKING FORCE = BRAKING FORCE + δ
S186
THE SAME DIRECTION VEHICLE SPEED ≧ PREDETERMINED VALUE?
S190
YES
NO
TAKE-OFF ASSISTANCE CONTROL TERMINATION
S192
RETURN

FIG. 11

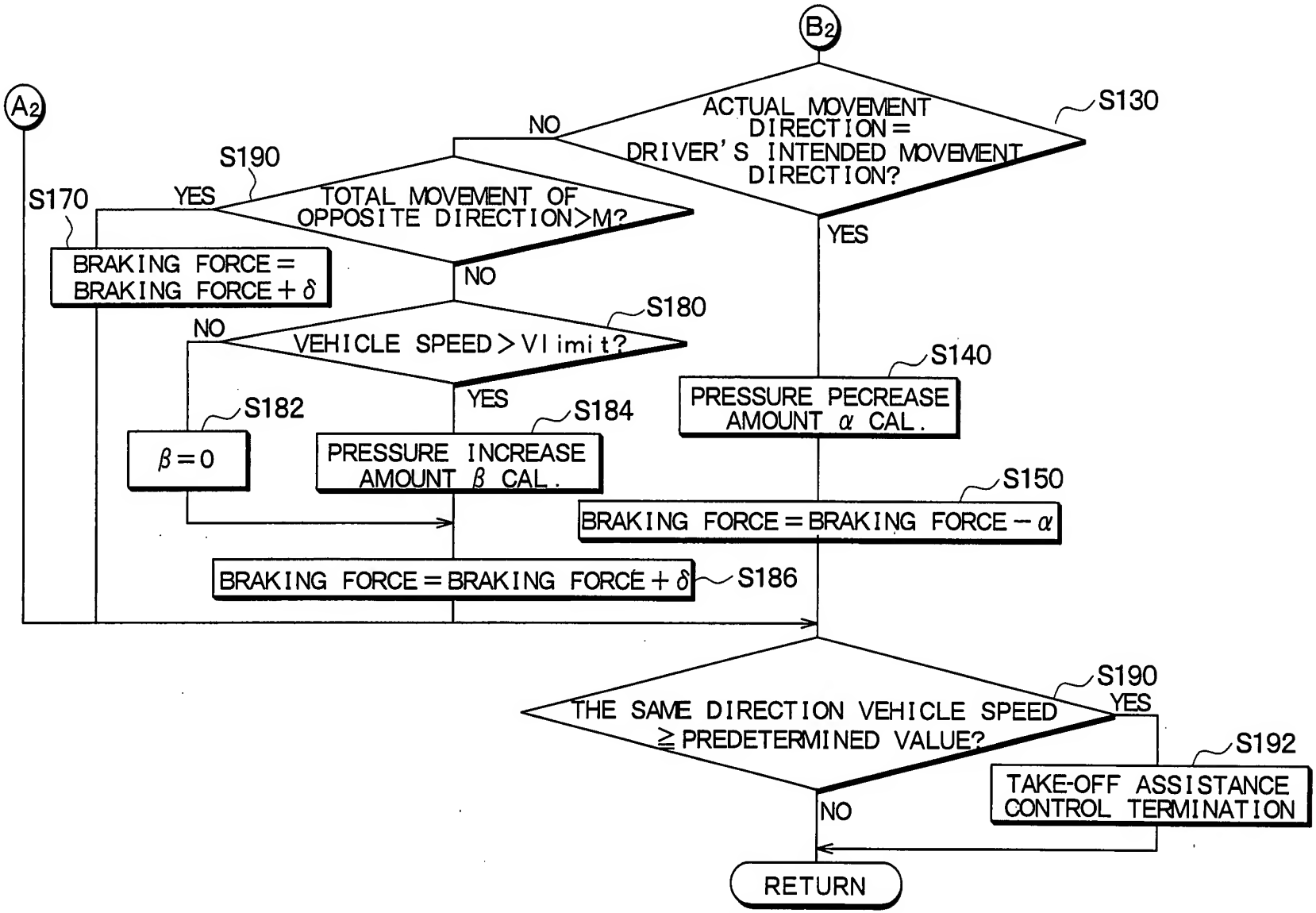

B2
A2
ACTUAL MOVEMENT DIRECTION = DRIVER'S INTENDED MOVEMENT DIRECTION?
S130
NO
YES
S190
TOTAL MOVEMENT OF OPPOSITE DIRECTION>M?
YES
NO
S170
BRAKING FORCE = BRAKING FORCE + δ
S180
NO
VEHICLE SPEED > Vlimit?
YES
S140
PRESSURE PECREASE AMOUNT α CAL.
S182
β = 0
S184
PRESSURE INCREASE AMOUNT β CAL.
S150
BRAKING FORCE = BRAKING FORCE − α
BRAKING FORCE = BRAKING FORCE + δ
S186
S190
THE SAME DIRECTION VEHICLE SPEED ≧ PREDETERMINED VALUE?
YES
S192
TAKE-OFF ASSISTANCE CONTROL TERMINATION
NO
RETURN

FIG. 12

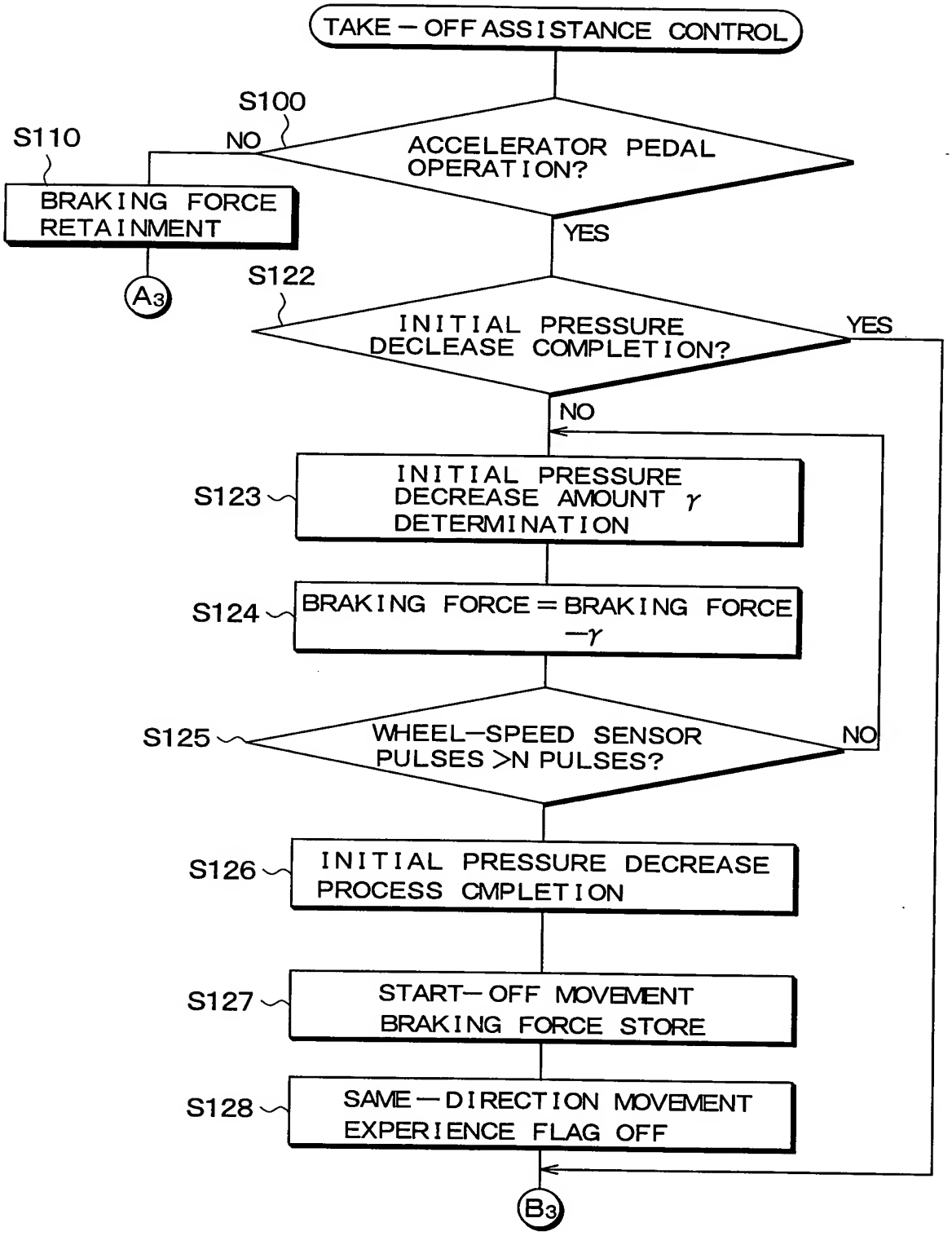

TAKE－OFF ASSISTANCE CONTROL
S100
ACCELERATOR PEDAL OPERATION?
NO
S110
BRAKING FORCE RETAINMENT
A3
YES
S122
INITIAL PRESSURE DECLEASE COMPLETION?
YES
NO
S123
INITIAL PRESSURE DECREASE AMOUNT γ DETERMINATION
S124
BRAKING FORCE＝BRAKING FORCE －γ
S125
WHEEL－SPEED SENSOR PULSES ＞N PULSES?
NO
S126
INITIAL PRESSURE DECREASE PROCESS CMPLETION
S127
START－OFF MOVEMENT BRAKING FORCE STORE
S128
SAME－DIRECTION MOVEMENT EXPERIENCE FLAG OFF
B3

FIG . 13

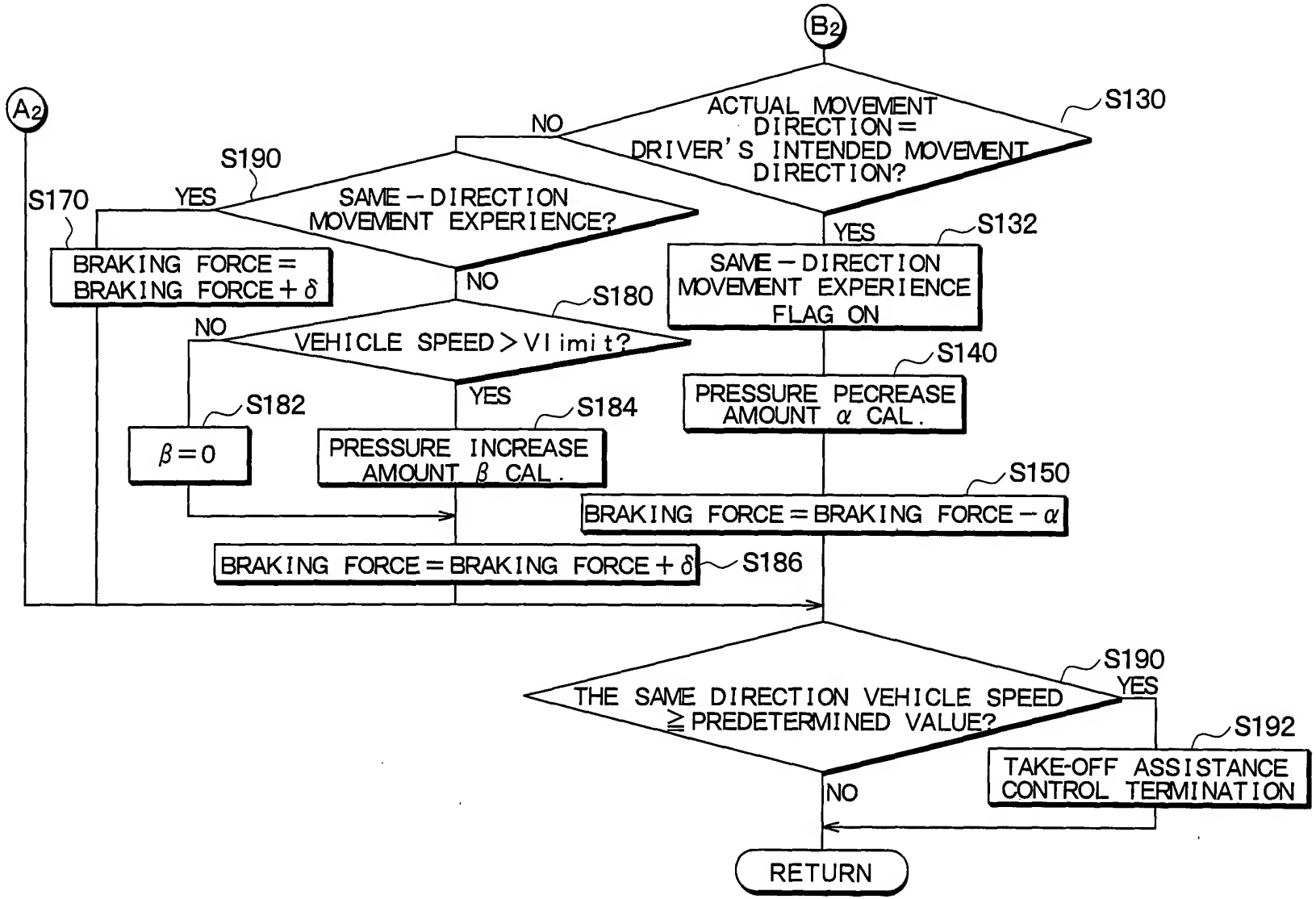

B2
A2
ACTUAL MOVEMENT DIRECTION = DRIVER'S INTENDED MOVEMENT DIRECTION?
S130
NO
YES
S132
SAME-DIRECTION MOVEMENT EXPERIENCE FLAG ON
S190
SAME-DIRECTION MOVEMENT EXPERIENCE?
S170
YES
BRAKING FORCE = BRAKING FORCE + δ
NO
S180
VEHICLE SPEED > Vlimit?
NO
YES
S140
PRESSURE PECREASE AMOUNT α CAL.
S182
β = 0
S184
PRESSURE INCREASE AMOUNT β CAL.
S150
BRAKING FORCE = BRAKING FORCE − α
BRAKING FORCE = BRAKING FORCE + δ
S186
S190
THE SAME DIRECTION VEHICLE SPEED ≧ PREDETERMINED VALUE?
YES
S192
TAKE-OFF ASSISTANCE CONTROL TERMINATION
NO
RETURN

FIG. 14

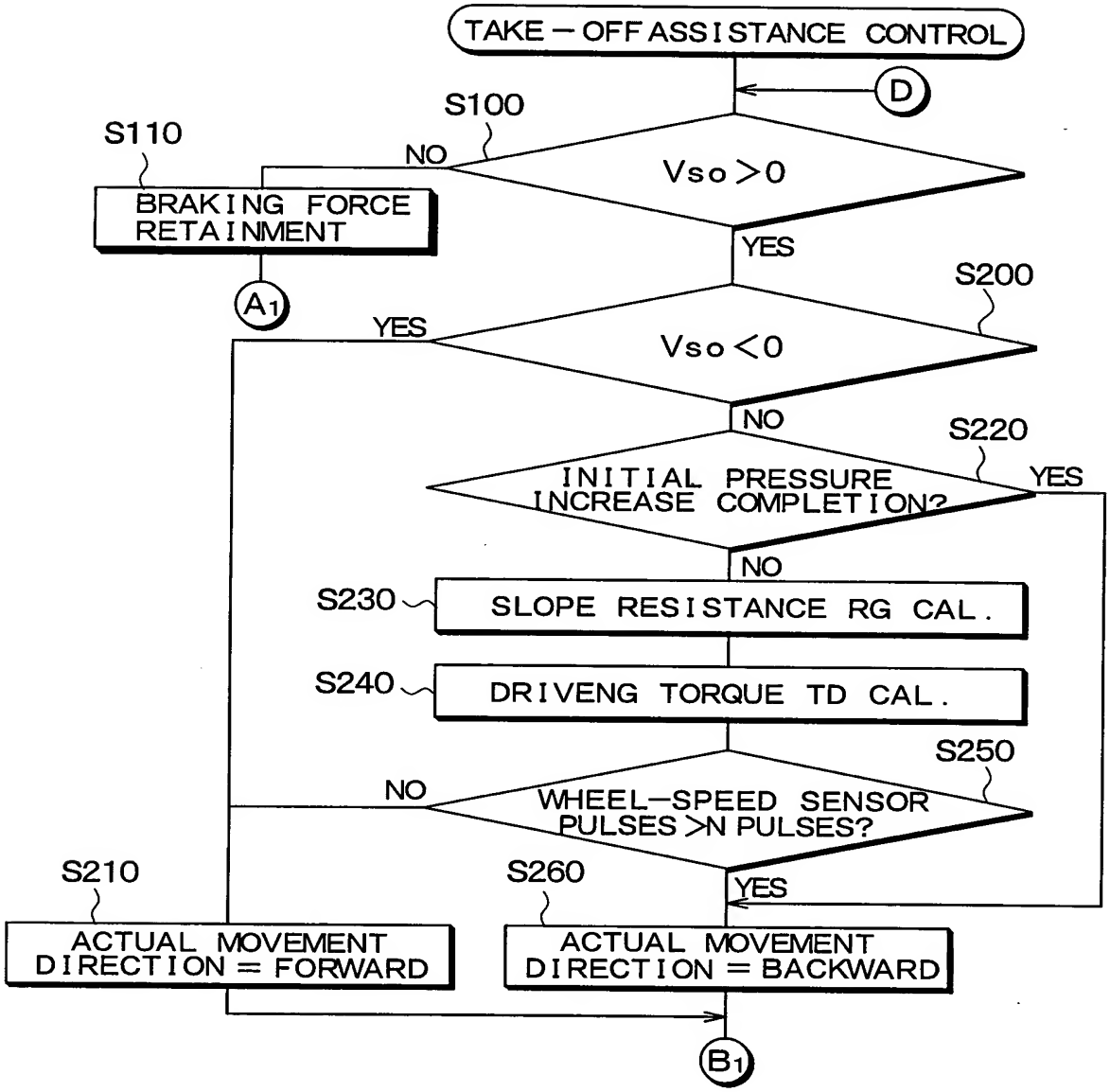

TAKE－OFF ASSISTANCE CONTROL
D
S100
Vso＞0
NO
YES
S110
BRAKING FORCE RETAINMENT
A1
S200
Vso＜0
YES
NO
S220
INITIAL PRESSURE INCREASE COMPLETION?
YES
NO
S230
SLOPE RESISTANCE RG CAL.
S240
DRIVENG TORQUE TD CAL.
S250
WHEEL－SPEED SENSOR PULSES ＞N PULSES?
NO
YES
S210
ACTUAL MOVEMENT DIRECTION = FORWARD
S260
ACTUAL MOVEMENT DIRECTION = BACKWARD
B1

FIG . 15

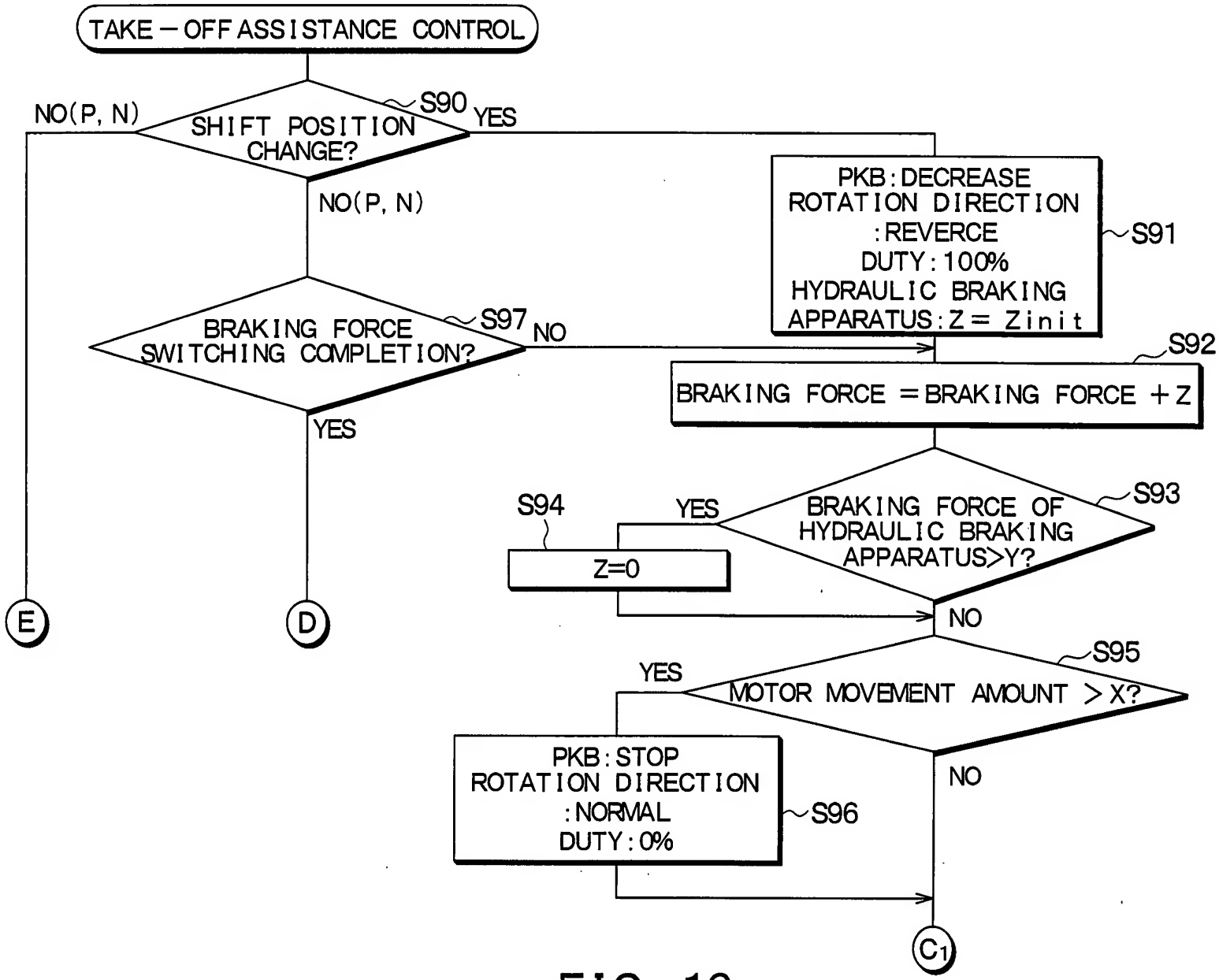

TAKE－OFF ASSISTANCE CONTROL
S90
SHIFT POSITION CHANGE?
NO(P, N)
YES
NO(P, N)
S97
BRAKING FORCE SWITCHING COMPLETION?
NO
YES
E
D
PKB:DECREASE ROTATION DIRECTION :REVERCE DUTY:100% HYDRAULIC BRAKING APPARATUS:Z＝Zinit
S91
S92
BRAKING FORCE ＝BRAKING FORCE ＋Z
S93
BRAKING FORCE OF HYDRAULIC BRAKING APPARATUS>Y?
YES
S94
Z=0
NO
S95
MOTOR MOVEMENT AMOUNT ＞X?
YES
NO
PKB:STOP ROTATION DIRECTION :NORMAL DUTY:0%
S96
C1

FIG . 16

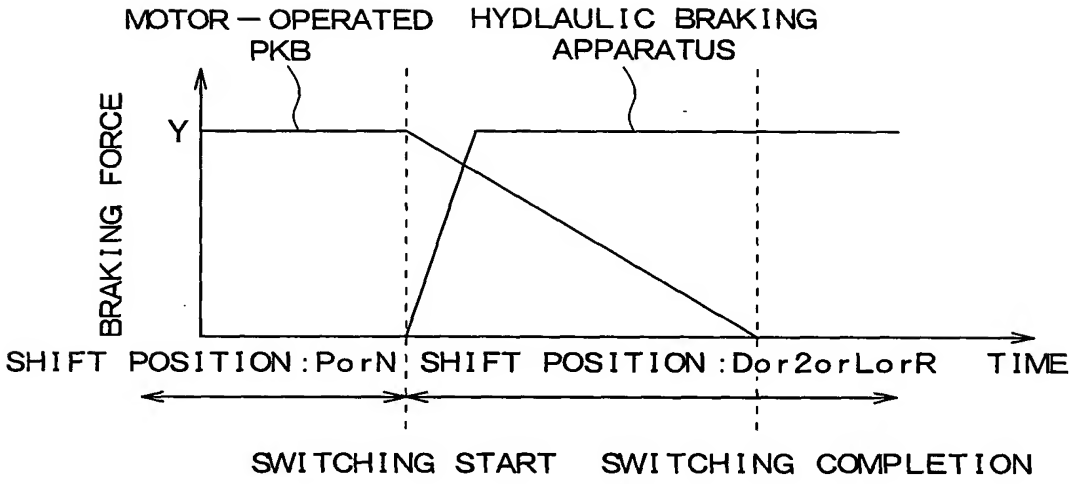

MOTOR－OPERATED PKB
HYDLAULIC BRAKING APPARATUS
BRAKING FORCE
Y
SHIFT POSITION : PorN
SHIFT POSITION : Dor2orLorR
TIME
SWITCHING START
SWITCHING COMPLETION

FIG . 17

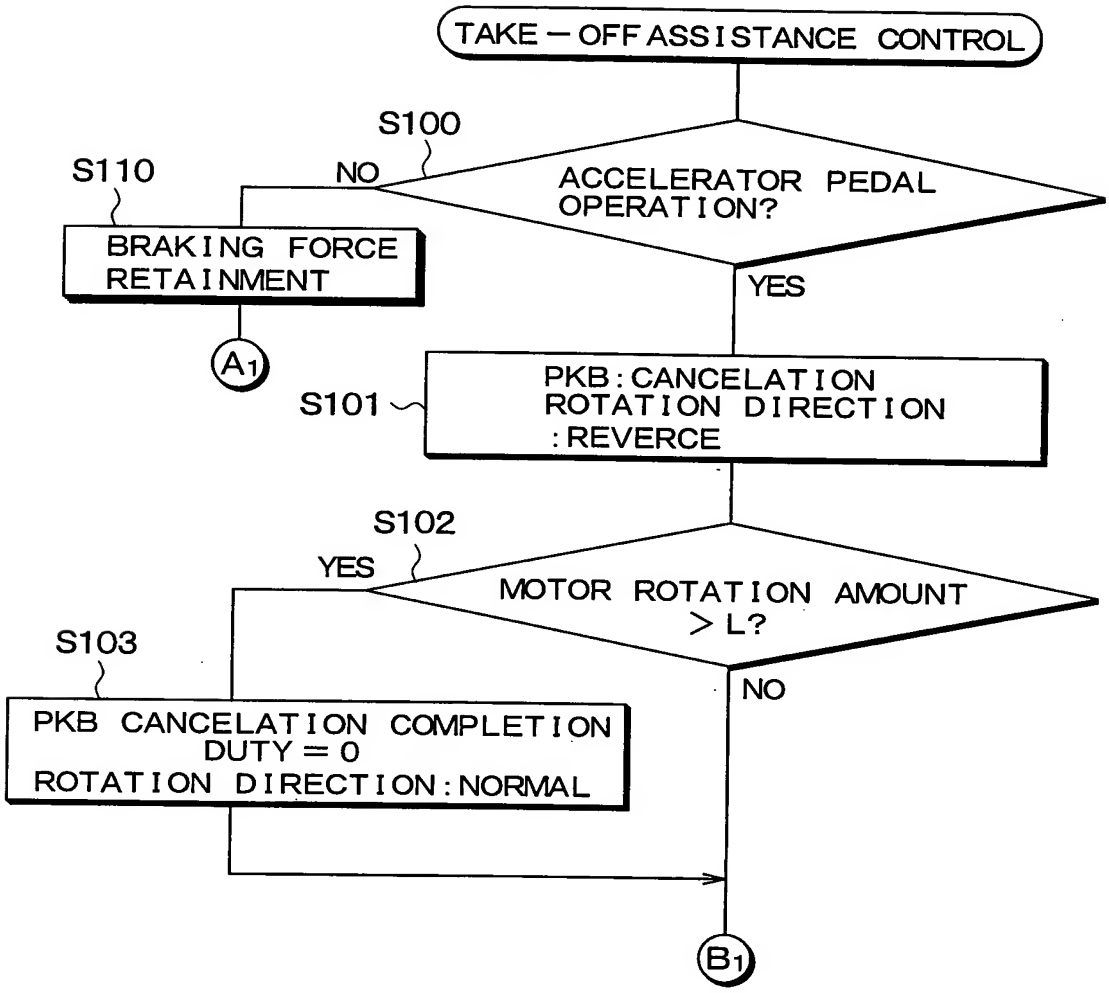

TAKE－OFF ASSISTANCE CONTROL
S100
ACCELERATOR PEDAL OPERATION?
NO
YES
S110
BRAKING FORCE RETAINMENT
A1
S101
PKB : CANCELATION ROTATION DIRECTION : REVERCE
S102
MOTOR ROTATION AMOUNT > L?
YES
NO
S103
PKB CANCELATION COMPLETION DUTY = 0 ROTATION DIRECTION : NORMAL
B1

FIG . 18